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EXAMINER
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BLACKMAN, ROCHELLE ANN J

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Please find below and/or attached an Office communication concerning this application or proceeding.



## **DETAILED ACTION**

### ***Claim Objections***

Claims 1-14 are objected to because of the following informalities: claim 1 recites the limitation "the display screen" in line 17. There is insufficient antecedent basis for this limitation in the claim.. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1, 2, 8, 9, 12-15, 17, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Itoh et al. (U.S. Patent No. 6,337,724).

Regarding claims 1, 2, 8, 9, and 12-14, Itoh discloses a display system (FIGS. 1-27) comprising: a lamp (50) providing a lamp output; a light integrator (20) optically coupled to the lamp output from the lamp and providing a homogenized light output; a beam splitter (32, 36) optically coupled to the homogenized light output from the light integrator and configured to provide a first light beam and a second light beam; a first imager (34, 35) optically coupled to the first light beam and producing a first modulated light beam; first projection optics (21,22) optically coupled to the first modulated light beam and configured to expand the first modulated light beam to form a first display

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image portion; a second imager (the second 34, 35 in Fig. 2 or the second element 20 in Fig. 27) optically coupled to the second light beam and producing a second modulated light beam; and second projection optics (the second 20, 21 in Fig. 2 and second element 20, which also contain projection optics 21 in Fig. 27) optically coupled to the second light beam and configured to expand the second modulated light beam to form a second display image portion on the display screen (1), wherein the first display image portion and the second image display portion are combined (for example, see image projected by projection optics 21 and 22 above element 60 and image projected by projection optics 21 and 22 below element 60 on display screen 1 in Fig. 2) at a margin (60) to form a display image; wherein the beam splitter (see 32, 36) is a polarizing beam splitter, the first light beam has a first polarization state, and the second light beam has a second polarization state; wherein the first imager is a first type of imager (see first imager 34, 35) and the second imager is a second type of imager (see the second imager 34, 35) different from the first type of imager; wherein the first projection optics provide a first optical path length between the light integrator and the first display image portion (see first projection optics in relation to light integrator 51 and first display image portion (image formed on display screen 1 above margin 60) in all Figs. 1 and 2) and the second projection optics provide a second optical path length between the light integrator and the second display image portion (see second projection optics in relation to light integrator 51 and first display image portion (image formed on display screen 1 below margin 60) all in Figs. 1 and 2), the first optical path length being essentially the same as the second optical path length (see 53 in Fig. 1

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and see optical paths in Fig. 2); wherein the first imager generates a first number of pixels, the second imager generates a second number of pixels, and the display image has a third number of pixels essentially equal to a sum of the first number of pixels and the second number of pixels (see Fig. 11 and col. 9, line 61 to col. 10, line 8); wherein the first number of pixels is about two million pixels and the second number of pixels is about two million pixels, the third number of pixels being about four million pixels (also see Fig. 11 and col. 9, line 61 to col. 10, line 8); further comprising: a second lamp (see second 50 of Fig. 27) providing a second lamp output; a second light integrator (light integrator 51 shown with lamp 50 in Fig. 2 is considered to also be provided for each lamp in Fig. 27) optically coupled to the second lamp output from the second lamp and providing a second homogenized light output; a second beam splitter (see second element 20, which contains beamsplitters 32 and 36 in Fig. 27) optically coupled to the second homogenized light output from the second light integrator and configured to provide a third light beam and a fourth light beam; a third imager (see third element 20, which also contains imager 34 and 35 in Fig. 27) optically coupled to the third light beam and producing a third modulated light beam; third projection optics (also see the third element 20 which contains projection optics 21 in Fig. 27) configured to expand the third modulated light image portion to form a third display image portion on the display screen; a fourth imager (see the fourth element 20, which contains imager 34 and 35 in Fig. 27) optically coupled to the fourth light beam and producing a fourth modulated light beam; fourth projection optics (also see the fourth element 20, which contains projection optics 21 in Fig. 27) optically coupled to the fourth modulated light beam and configured

to expand the fourth modulated light beam to form a fourth display image portion on the display screen, wherein the first display image portion, the second display image portion, the third display image portion, and the fourth display image portion are combined at margins to form the display image (see Figs. 11 and 18).

Regarding claims 15, 17, and 18, Itoh discloses a display system (Figs. 1-27) comprising: means for providing a light output (50); means for homogenizing the light output (51) to provide a homogenized light output means for splitting the homogenized light output to provide a first light beam and a second light beam; means for imaging the first light beam (34, 35) to provide a first image portion having a first number of pixels; means for imaging the second light beam (second 34, 35) to provide a second image portion having a second number of pixels, wherein the first image portion is stitched to the second image portion at a margin to provide an image having a third number of pixels essentially equal to a sum of the first number of pixels and the second number of pixels (see Fig. 11, and col. 9, line 61 to col. 10, line 8); wherein the means for splitting comprises a polarizing beam splitter (see 32, 36); wherein the means for imaging the first light beam are different from the means for imaging the second light beam (see first and second 34, 35).

2. Claims 1, 2, 8, and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Saccomanno (U.S. Patent Application Publication No. 2001/0048801).

Saccomanno discloses a display system (see FIGS. 2-4) comprising: a lamp (200) providing a lamp output; a light integrator (305) optically coupled to the lamp output from the lamp and providing a homogenized light output; a beam splitter (300 or

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350) optically coupled to the homogenized light output from the light integrator and configured to provide a first light beam and a second light beam; a first imager (410 or 415) optically coupled to the first light beam and producing a first modulated light beam; first projection optics (401) optically coupled to the first modulated light beam and configured to expand the first modulated light beam to form a first display image portion (101A); a second imager (also 410 or 415, see pg. 2, paragraph [0022] and pg. 3, paragraph [0030]) optically coupled to the second light beam and producing a second modulated light beam; and second projection optics (also 401, see pg. 2, paragraph [0022] and pg. 3, paragraph [0030]) optically coupled to the second light beam and configured to expand the second modulated light beam to form a second display image portion (101N) on the display screen (100), wherein the first display image portion and the second image display portion are combined at a margin to form a display image (see FIG. 3); wherein the beam splitter is a polarizing beam splitter (see 300 or 320), the first light beam has a first polarization state, and the second light beam has a second polarization state; wherein the first imager is a first type of imager (see 410 or 415) and the second imager is a second type of imager (see 410 or 415) different from the first type of imager; wherein the first projection optics provide a first optical path length (see 502 between light integrator 305 and first display image portion 101A in FIG. 3 or 512 between light integrator 305 and first display image portion 101A in FIG. 4) and between the light integrator and the first display image portion and the second projection optics provide a second optical path length (502 between light integrator 305 and second display image portion 101N in FIG. 3 and 512 between light integrator 305

and second display image portion 101N in FIG. 4) between the light integrator and the second display image portion, the first optical path length being essentially the same as the second optical path length.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 2, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dehmlow (U.S. Patent No. 6,473,240) in view of Saccomanno (U.S. Patent Application Publication No. 2001/0048801).

Dehmlow discloses a display system (Figs. 2-4) comprising: a lamp (110, 120) providing a lamp output; a beam splitter (202, 302) optically coupled to the homogenized light output from the light integrator and configured to provide a first light beam and a second light beam; a first imager (114) optically coupled to the first light beam and producing a first modulated light beam; first projection optics (118) optically coupled to the first modulated light beam and configured to expand the first modulated light beam to form a first display image portion (119); a second imager (124 or 314) optically coupled to the second light beam and producing a second modulated light beam; and second projection optics (128) optically coupled to the second light beam and configured to expand the second modulated light beam to form a second display



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image portion (129) on the display screen (130), wherein the first display image portion and the second image display portion are combined at a margin to form a display image (see 119, 129, and 130); wherein the beam splitter is a polarizing beam splitter (see 202, 302), the first light beam has a first polarization state, and the second light beam has a second polarization state; wherein the first imager is a first type of imager (see 114) and the second imager is a second type of imager (see 124 or 314) different from the first type of imager; wherein the first projection optics provide a first optical path length (see 204 of Fig. 2 or 204 and 306 of Fig. 3)... and the second projection optics provide a second optical path length (see 206 of Fig. 2 and 206A,B or 304A,B in Fig. 3..., the first optical path length being essentially the same as the second optical path length.

Dehmlow does not appear to disclose a light integrator optically coupled to the lamp output from the lamp and providing a homogenized light output.

Saccomanno discloses a projection system using fiber optic illumination and teaches that it is important to have adequate homogenization of light entering light separation unit 300 in order that the flux entering second set of fiber optic cables 502 is equally distributed in the projection system and such homogenization is accomplished between collimators 305 and the entrance to first primary color light separation unit 301 (see pg. 2, paragraph [0025] and Figs. 2-4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the display system of Dehmlow with a collimator or collimators, as taught by Saccomanno in order to homogenize the light entering the

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beamsplitter or imagers of the Dehmlow reference, thus providing equally distributed light.

2. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Itoh et al. (U.S. Patent No. 6,337,724) in view Yamamoto (U.S. Patent No. 6,773,111).

Itoh discloses the claimed invention except for a polarizing beam splitter that is a wire-grid polarizing beam splitter.

Yamamoto discloses using a wire-grid type PBS for yielding a favorable polarization separation angle characteristic in a projection type image display apparatus (see col. 16, lines 38-53).

It would have been obvious to one ordinary skill in the art at the time invention was made to provide the display system of the Itoh reference with a wire-grid type PBS, as taught by Yamamoto in order to yield a favorable polarization separation angle characteristic in the display system.

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saccomanno (U.S. Patent Application Publication No. 2001/0048801) in view of Yamamoto (U.S. Patent No. 6,773,111).

Saccomanno discloses the claimed invention except for a polarizing beam splitter that is a wire-grid polarizing beam splitter.

Yamamoto discloses using a wire-grid type PBS for yielding a favorable polarization separation angle characteristic in a projection type image display apparatus (see col. 16, lines 38-53).

It would have been obvious to one ordinary skill in the art at the time invention was made to provide the display system of the Saccomanno reference with a wire-grid type PBS, as taught by Yamamoto in order to yield a favorable polarization separation angle characteristic in the display system.

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dehmlow (U.S. Patent No. 6,473,240) in view of Saccomanno (U.S. Patent Application Publication No. 2001/0048801) as applied to claim 1 above, and further in view of Yamamoto (U.S. Patent No. 6,773,111).

Dehmlow and Saccomanno disclose the claimed invention except for a polarizing beam splitter that is a wire-grid polarizing beam splitter.

Yamamoto discloses using a wire-grid type PBS for yielding a favorable polarization separation angle characteristic in a projection type image display apparatus (see col. 16, lines 38-53).

It would have been obvious to one ordinary skill in the art at the time invention was made to provide the display system of the combined Dehmlow and Saccomanno reference with a wire-grid type PBS, as taught by Yamamoto in order to yield a favorable polarization separation angle characteristic in the display system.

5. Claims 10, 11, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Itoh et al. (U.S. Patent No. 6,337,724) in view of Svoldal et al. (U.S. Patent No. 6,547,396).

Itoh discloses the claimed invention except for a color wheel disposed between the lamp and the beam splitter and between the lamp and the light integrator and

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means for sequentially providing selected colors of light disposed between the means for providing a light output and the means for spitting the homogenized light output.

Svardal uses a color wheel 26, which is disposed between light source 22 and beam splitter 36 and between light source 22 and integrator 28, in the projection system, to allow the projection of color images via the use of a single image-producing element for all three primary colors (see Fig. 2 and col. 3, lines 61-65).

It would have been obvious to one of ordinary skill in the art at the time invention was made to provide the display system of Ito with a color wheel, as taught by Svardal in order to allow the projection of color images via the use of a single image-producing element for all three primary colors.

6. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saccomanno (U.S. Patent Application Publication No. 2001/0048801) in view of Svardal et al. (U.S. Patent No. 6,547,396).

Saccomanno discloses the claimed invention except for a color wheel disposed between the lamp and the beam splitter and between the lamp and the light integrator.

Svardal uses a color wheel 26, which is disposed between light source 22 and beam splitter 36 and between light source 22 and integrator 28, in the projection system, to allow the projection of color images via the use of a single image-producing element for all three primary colors (see Fig. 2 and col. 3, lines 61-65).

It would have been obvious to one of ordinary skill in the art at the time invention was made to provide the display system of Ito with a color wheel between the light source and beamsplitter as well as between the light source and between the integrator,

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as taught by Svardal in order to allow the projection of color images via the use of a single image-producing element for all three primary colors.

7. Claim 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dehmlow (U.S. Patent No. 6,473,240) in view of Saccomanno (U.S. Patent Application Publication No. 2001/0048801) as applied to claim 1 above, and further in view of Svardal et al. (U.S. Patent No. 6,547,396).

Dehmlow and Saccomanno disclose the claimed invention except for a color wheel disposed between the lamp and the beam splitter and between the lamp and the light integrator.

Svardal uses a color wheel 26, which is disposed between light source 22 and beam splitter 36 and between light source 22 and integrator 28, in the projection system, to allow the projection of color images via the use of a single image-producing element for all three primary colors (see Fig. 2 and col. 3, lines 61-65).

It would have been obvious to one of ordinary skill in the art at the time invention was made to provide the display system of the combined the combined Dehmlow and Saccomanno reference with a color wheel between the light source and beamsplitter as well as between the light source and between the integrator, as taught by Svardal in order to allow the projection of color images via the use of a single image-producing element for all three primary colors.

***Allowable Subject Matter***

1. Claims 4-7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
2. The following is a statement of reasons for the indication of allowable subject matter: claims 4-7 have been found to be allowable because the prior art of record either alone or in combination neither discloses nor makes obvious the display system comprising the particular feature of a "third polarizing beam splitter disposed between the polarizing beam splitter and the second liquid-crystal-on-silicon spatial light modulator" of claim 4 in combination with the other particular combination of features recited in claims 1, 2, and 4.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rochelle Blackman whose telephone number is (571) 272-2113. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Nguyen can be reached on (571) 272-2258. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RB

A handwritten signature in black ink, appearing to read "Judy Nguyen", with a stylized, cursive script.

JUDY NGUYEN  
PRIMARY EXAMINER